GSFC 429-99-04-01

NATIONAL POLAR-ORBITING OPERATIONAL ENVIRONMENTAL SATELLITE SYSTEM (NPOESS) PREPARATORY PROJECT (NPP)

UNIQUE INSTRUMENT INTERFACE DOCUMENT (UIID) FOR THE VISIBLE INFRARED IMAGING RADIOMETER SUITE (VIIRS) INSTRUMENT

REVISION A

February 8, 2002

CHECK THE NPP WEBSITE AT http://jointmission.gsfc.nasa.gov TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE.

GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND

INTEGRATED PROGRAM OFFICE
SILVER SPRING, MARYLAND

UNIQUE INSTRUMENT INTERFACE DOCUMENT (UIID)
FOR THE
VISIBLE INFRARED IMAGING RADIOMETER SUITE (VIIRS)
INSTRUMENT

NPP MISSION

February 8, 2002

GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND

INTEGRATED PROGRAM OFFICE
SILVER SPRING, MARYLAND

CHECK THE NPP WEBSITE AT http://jointmission.gsfc.nasa.gov TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE.

Unique Instrument Interface Document (UIID)
for the
Visible Infrared Imaging Radiometer Suite (VIIRS) Instrument

NPP Mission

Prepared By:

Original signed by

Ralph Welsh, NASA GSFC Date
Instrument Accommodations Manager, NPP

Reviewed By:

Original signed by

Captain Ken Speidel, IPO Date
VIIRS Instrument Manager, NPP

Original signed by

Kevin Grady, NASA GSFC Date
Project Manager, NPP

Original signed by

Peter Wilczynski, IPO Date
NPP Project Manager, NPOESS

Approved By:

Original signed by

Phillip Sabelhaus, NASA GSFC Date
Associate Director/EOS Program Manager

Original signed by

John D. Cunningham, IPO Date
System Program Director, NPOESS IPO

GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND

INTEGRATED PROGRAM OFFICE
SILVER SPRING, MARYLAND

CHECK THE NPP WEBSITE AT http://jointmission.gsfc.nasa.gov TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE.

CHANGE RECORD PAGE

DOCUMENT TITLE: Unique Instrument Interface Document (UIID) for Visible Infrared Imaging Radiometer Suite (VIIRS) Instrument

DOCUMENT DATE: February 8, 2002

ISSUE	DATE	PAGES AFFECTED	DESCRIPTION
Original	02/27/2001	All pages affected	Approved by CCR 429-01-04-001
CH-01	06/18/2001	Pages: iii, iv, 3-5, 3-6, 3-7, 3-8, and 3-9.	Approved by CCR 429-01-04-002
Revision A	02/25/2002	All pages affected	Approved by CCR 429-01-04-003R3

EOS 420-CM-05 (4/92)

CHECK THE NPP WEBSITE AT http://jointmission.gsfc.nasa.gov TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE.

DOCUMENT TITLE:
Unique Instrument Interface Document (UIID) for the Visible Infrared Imaging Radiometer Suite (VIIRS) Instrument

RELEASE DATE:
February 8, 2002

LIST OF AFFECTED PAGES

Page No.	Revision	Page No.	Revision	Page No.	Revision	Page No.	Revision
Cover Page	Rev. A						
Title Page	Rev. A						
Signature Page	Rev. A						
iii	Rev. A						
iv	Rev. A						
v	Rev. A						
vi	Rev. A						
1-1	Rev. A						
2-1	Rev. A						
3-1	Rev. A						
3-2	Rev. A						
3-3	Rev. A						
3-4	Rev. A						
3-5	Rev. A						
3-6	Rev. A						
3-7	Rev. A						
3-8	Rev. A						
3-9	Rev. A						
3-10	Rev. A						
3-11	Rev. A						
3-12	Rev. A						
3-13	Rev. A						
3-14	Rev. A						
3-15	Rev. A						
4-1	Rev. A						
5-1	Rev. A						
6-1	Rev. A						
6-2	Rev. A						
6-3	Rev. A						
6-4	Rev. A						
6-5	Rev. A						

EOS 420-CM-04 (4/92)

CHECK THE NPP WEBSITE AT http://jointmission.gsfc.nasa.gov TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE.

Table of Contents

Section Page

1.0 SCOPE 1-1

2.0 APPLICABLE DOCUMENTS 2-1

3.0 ALLOCATIONS 3-1
3.1 COMMAND AND DATA HANDLING ALLOCATIONS 3-1
3.1.1 Science Data 3-1
3.1.2 Command, Telemetry, and Science Data 3-1
3.1.3 Science-Data Application Process IDs 3-1
3.1.4 Discrete Interface Allocation 3-1
3.1.5 Deleted 3-2
3.1.6 Instrument Housekeeping Data Rate Allocation 3-2
3.1.7 Deleted 3-2
3.2 POWER ALLOCATIONS 3-2
3.2.1 Power/Power Return Feeds 3-2
3.2.2 Peak Operational Power Allocation 3-2
3.2.3 Average Operational Power Allocation 3-2
3.2.4 Average Calibration Power Allocation 3-3
3.2.5 Average Outgassing Power Allocation 3-3
3.2.6 Maximum Survival-Mode Power Allocation 3-3
3.2.7 Telescope Stow Power Allocation 3-3
3.2.8 Launch-Mode Power Allocation 3-3
3.3 MECHANICAL ALLOCATIONS 3-3
3.3.1 Mass Properties 3-3
3.3.2 Volume and Fields-of-View Allocations 3-3
3.3.3 Instrument Mounting 3-4
3.4 POINTING ALLOCATIONS 3-11

4.0 CONSTRAINTS 4-1

5.0 DEVIATIONS / WAIVERS 5-1
5.1 GIID DEVIATIONS / WAIVERS 5-1
5.2 VIIRS SENSOR SPECIFICATION DEVIATIONS / WAIVERS 5-1

6.0 APPENDICES 6-1
Appendix A VIIRS Resource Summary (Form) 6-2
Appendix B Acronyms 6-3
Appendix C VIIRS UIID Rationale Matrix 6-4

CHECK THE NPP WEBSITE AT http://jointmission.gsfc.nasa.gov TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE.

Table of Contents (continued)

Illustrations

Figure Page

3-1 VIIRS Launch Volume Allocation 3-5
3-2 VIIRS Operational Volume Allocation 3-6
3-3 VIIRS Radiometric Field-of-View Allocation 3-7
3-4 VIIRS Detector-Cooling Field-of-View Allocation 3-8
3-5 VIIRS Thermal Field-of-View Allocation 3-9
3-6 VIIRS Installation/Removal Volume Allocation 3-10
3-7 VIIRS Pointing Terminology 3-11
3-8 VIIRS Pointing Knowledge Budget 3-13
3-9 VIIRS Pointing Control Pointing Budget 3-13

Tables

Table Page

3-1 VIIRS Geolocation, Position and Pointing Requirements and Allocations 3-12
3-2 VIIRS Jitter Requirements and Allocations 3-14
3-3 VIIRS Rate Stability Requirements and Allocations 3-15
A-1 VIIRS Resource Summary (Form) 6-2
C-1 VIIRS UIID Rationale Matrix 6-4

CHECK THE NPP WEBSITE AT http://jointmission.gsfc.nasa.gov TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE.

1.0 SCOPE

The purpose of this Unique Instrument Interface Document (UIID) is to allocate key spacecraft resources and to document certain interface requirements that are unique to the accommodation of the Visible Infrared Imaging Radiometer Suite (VIIRS) instrument on the NPP spacecraft.

The UIID documents the NPP spacecraft resources, such as mass, power, and data rate, specifically allocated to the VIIRS instrument in Section 3. Constraints on the integration and test of the instrument and other requirements and procedures are in Section 4. Approved deviations/waivers to interface requirements are in Section 5.

Within the hierarchy of NPP Spacecraft documentation, the UIID has precedence over the General Instrument Interface Document (GIID). This UIID, in conjunction with the GIID, and the VIIRS Interface Description Document (IDD) establishes the instrument-to-spacecraft interface requirements. This UIID establishes instrument resource requirements for the NPP Spacecraft. Resource requirements are derived from the instrument specification plus the NPP Contingency. In the event of a conflict in instrument resource allocation (without contingency) between the referenced VIIRS Performance Specification and this UIID, the NPP Contracting Officer shall be notified, and the order of precedence will be as directed by the contracting officer. The VIIRS interface control documents (GIID, VIIRS IDD, and the NPP VIIRS ICD) establish the details of the electrical, mechanical, thermal, integration and test, and command and data handling (C&DH) interfaces between the VIIRS instrument and the NPP spacecraft.

2.0 APPLICABLE DOCUMENTS

The following documents specify interface and performance assurance requirements:

a. VIIRS System / Subsystem Performance Specification, which consists of:

1. VIIRS Interface Description document (IDD) (IDD 154640-103),
2. VIIRS Sensor Specification (PRF PS 154640-101)
3. VIIRS System Specification (PRF SS 154640-001)
4. VIIRS Interface Control Drawing, Raytheon Drawing Number 414501-500, revision 04, sheets 1 through 7

b. NPOESS Preparatory Project (NPP) / National Polar-Orbiting Operational Environmental Satellite System (NPOESS) General Instrument Interface Document (GIID)

1. NPOESS FT 1394 Interface Requirements Document
2. 1553 Interface Requirements Document for NPOESS

3.0 ALLOCATIONS

The NPP Spacecraft will accommodate the VIIRS Instrument. The resources specifically allocated to the instrument are defined in the following paragraphs. All interfaces are redundant, and are designated as A and B respectively.

3.1 COMMAND AND DATA HANDLING ALLOCATIONS

The instrument is allocated the Command and Data Handling (C&DH) resources identified in the following paragraphs.

3.1.1 Science Data

3.1.1.1 Average Science Data Rate Allocation - The instrument is allocated an orbit average science data rate at the interface to the spacecraft, including all overhead associated with CCSDS packetization by the instrument, of 8 Mbps.

3.1.1.2 Peak Science Data Rate Allocation - The instrument is allocated a peak data rate after compression at the interface to the spacecraft, including all overhead associated with CCSDS packetization by the instrument, of 10.5 Mbps.

3.1.2 Command, Telemetry, and Science Data

3.1.2.1 Interface Buses - The instrument is allocated two (2) redundant Command, Telemetry, and Science Data Interface Buses, Primary (A1, B1) and Redundant (A2, B2). (TBR)

3.1.3 Science-Data Application Process IDs

The instrument is allocated the science-data APIDs as defined in the 1553 IRD.

3.1.4 Discrete Interface Allocation

The instrument is allocated the following discrete interfaces:

3.1.4.1 Pulse Commands

16, (8 Primary, 8 Redundant)

3.1.4.2 Bi-Level Digital Telemetry

4, (2 Primary, 2 Redundant)

3.1.4.3 Passive Analog Telemetry

12, (6 Primary, 6 Redundant)

3.1.4.4 Time of Day Pulse

2, (1 Primary, 1 Redundant)

3.1.5 Deleted

3.1.6 Instrument Housekeeping Data Rate Allocation

The instrument is allocated a maximum housekeeping data rate at the interface to the Spacecraft, including all overhead associated with CCSDS packetization by the instrument, of 2 Kbps (TBR). This is in addition to the science data rates.

3.1.7 Deleted

3.2 POWER ALLOCATIONS

The average and peak operational power allocations include contingencies to be managed by the instrument provider. These allocations are the maximum levels allowed and can never be exceeded. The form for tracking contingencies is included in Appendix A.

3.2.1 Power/Power Return Feeds

The instrument shall be supplied with four operational power/power return feeds referred to as Instrument Operational Power A1 and B1. The Telescope Stow Power is A2 and B2.

The instrument shall be supplied with twelve survival power/power return feeds referred to as Heater Power #1, 2, 3, 4, 5, and 6.

3.2.2 Peak Operational Power Allocation

The peak power allocated to the instrument is 300 watts. The spacecraft shall accommodate contingency of 45 watts.

3.2.3 Average Operational Power Allocation

Definition: The one-orbit average power is the average power for a given mode utilized by an instrument over any one-orbit period commencing with the crossing of the night-to-day terminator.

The one-orbit average operational power allocated to the instrument is 200 watts. The spacecraft shall accommodate contingency of 50 watts allocated to the instrument.

3.2.4 Average Calibration Power Allocation

The one-orbit average calibration power allocated to the instrument is 240 watts. The spacecraft shall accommodate a contingency of 60 watts allocated to the instrument.

3.2.5 Average Outgassing Power Allocation

The one-orbit average outgassing power allocated to the instrument is 300 watts. The spacecraft shall accommodate a contingency of 45 watts allocated to the instrument.

3.2.6 Maximum Survival-Mode Power Allocation

The maximum survival-mode power allocated to the instrument is 150 watts. The spacecraft shall accommodate a contingency of 30 watts.

3.2.7 Telescope Stow Power Allocation

The Telescope Stow Power shall be provided from an essential (always on) powerbus. The spacecraft shall accommodate a telescope stow power of 5 watts (3 watts nominal plus 2 watts contingency).

3.2.8 Launch-Mode Power Allocation

The launch-mode power allocated to the instrument is zero (0) watts.

3.3 MECHANICAL ALLOCATIONS

The instrument shall have the mechanical allocations identified in the following paragraphs.

3.3.1 Mass Properties

The mass allocation includes contingency to be managed by the instrument provider. This allocation may not be exceeded. The form for tracking contingencies is included in Appendix A.

3.3.1.1 Mass Allocation - The total mass allocated to the instrument is 200 kilograms. The spacecraft shall accommodate contingency of 50 kilograms allocated to the instrument. This allocation applies only to components supplied by the instrument provider.

3.3.1.2 Mass Expendables - The instrument, while on-orbit, will not expel any mass (except for outgassing).

3.3.2 Volume and Fields-of-View Allocations

3.3.2.1 Launch Volume Allocation - The instrument is allocated the launch volume as shown in Figure 3-1.

3.3.2.2 Operational Volume Allocation - The instrument is allocated the operational volume as shown in Figure 3-2.

3.3.2.3 Radiometric Fields-of-View Allocations - The instrument is allocated the radiometric fields-of-view as shown in Figure 3-3.

3.3.2.4 Detector-Cooling, Solar Calibration, Glint and Thermal Fields-of-View Allocation - The instrument is allocated the detector-cooling, solar calibration, glint and thermal fields-of-view as shown in Figures 3-4 and 3-5.

3.3.2.5 Installation/Removal Volume Allocation

The instrument volume allocated for facilitating installation and removal is shown in Figure 3-6.

3.3.3 Instrument Mounting

The instrument Opto-Mechanical Module shall be attached to the NPP spacecraft structure with four kinematic mounts. The mounts are 10.2 cm in height. The Instrument Electronics Module is attached with 8 (TBR) bolts.

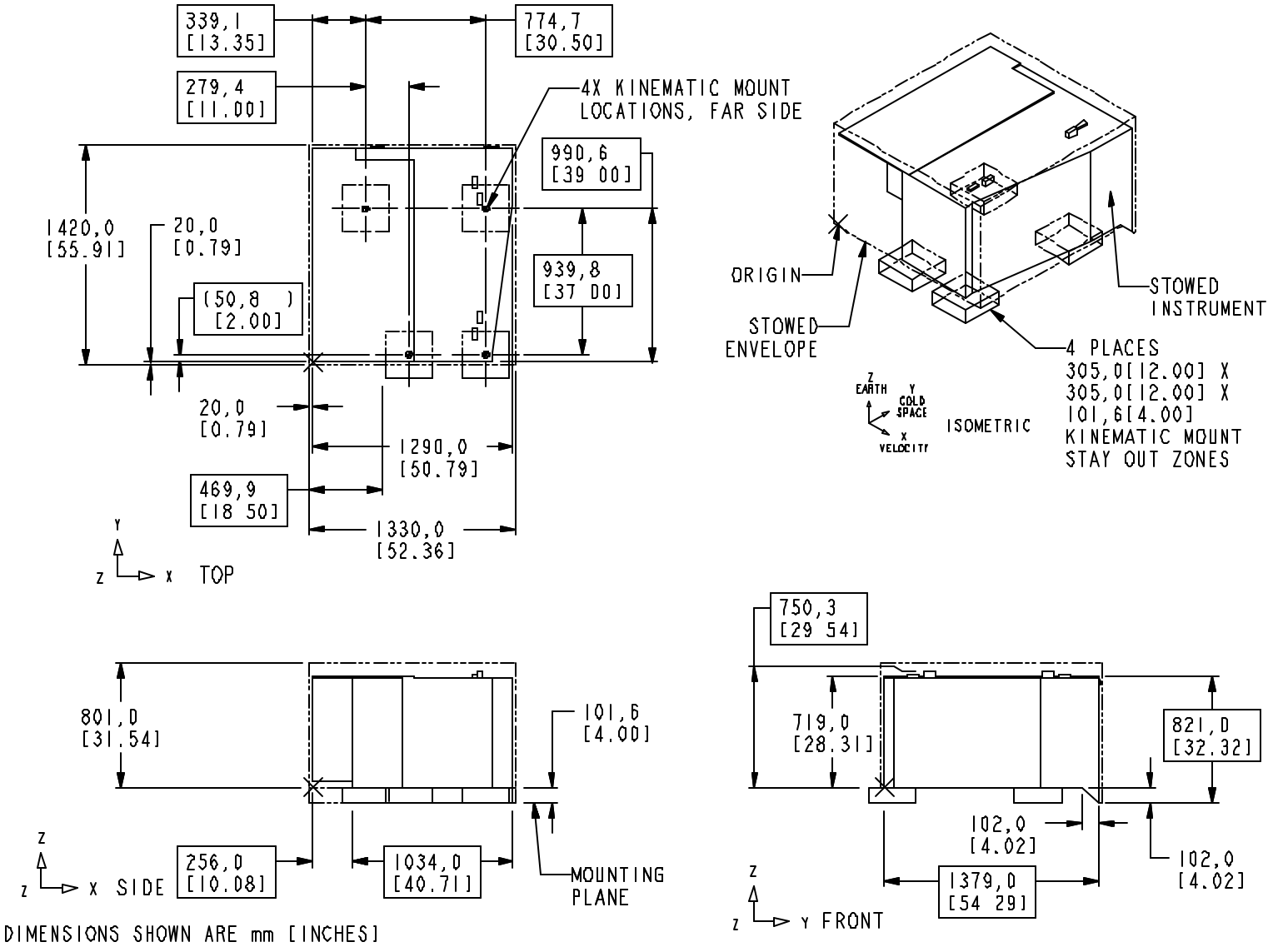


Figure 3-1. VIIRS Launch Volume Allocation

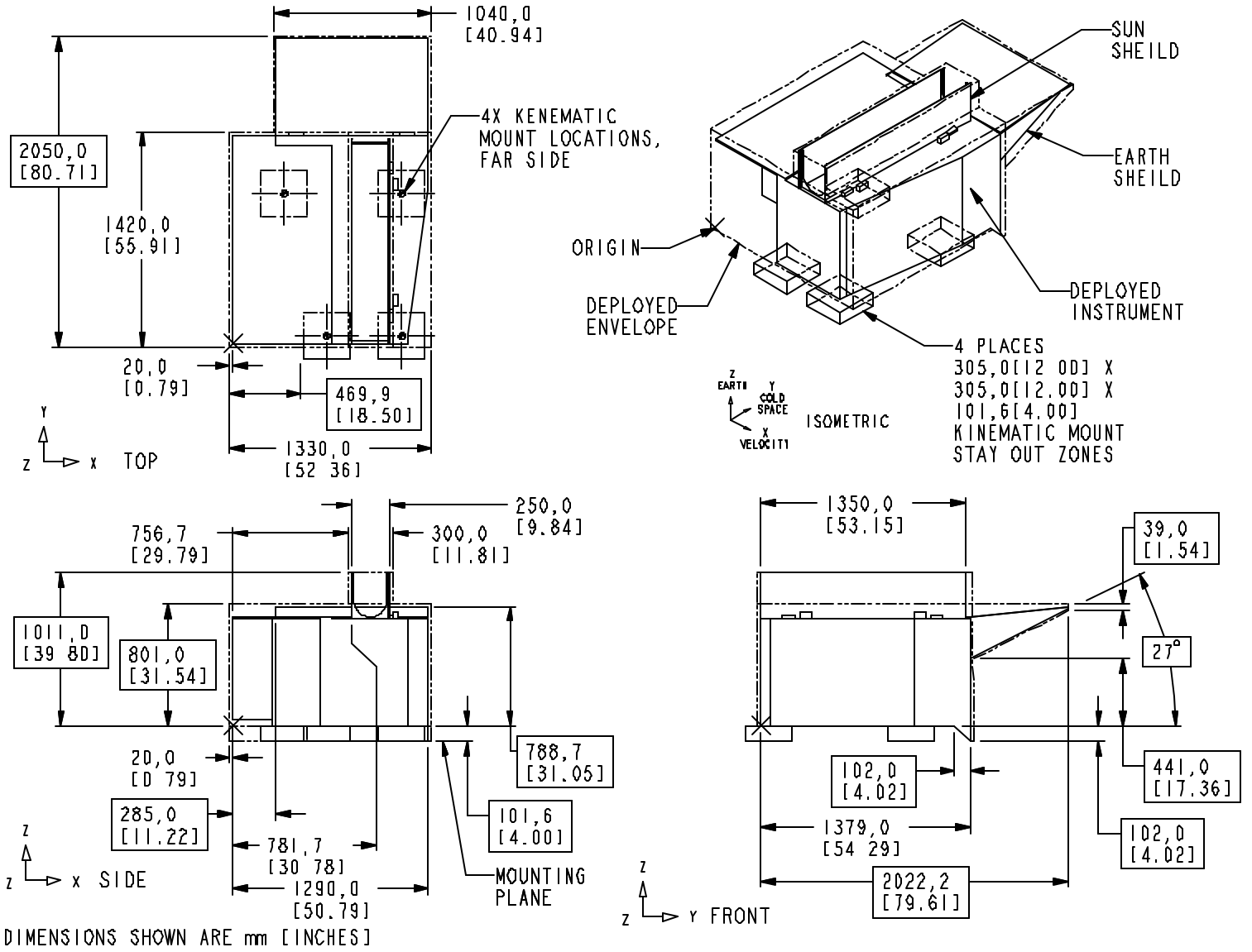


Figure 3-2. VIIRS Operational Volume Allocation

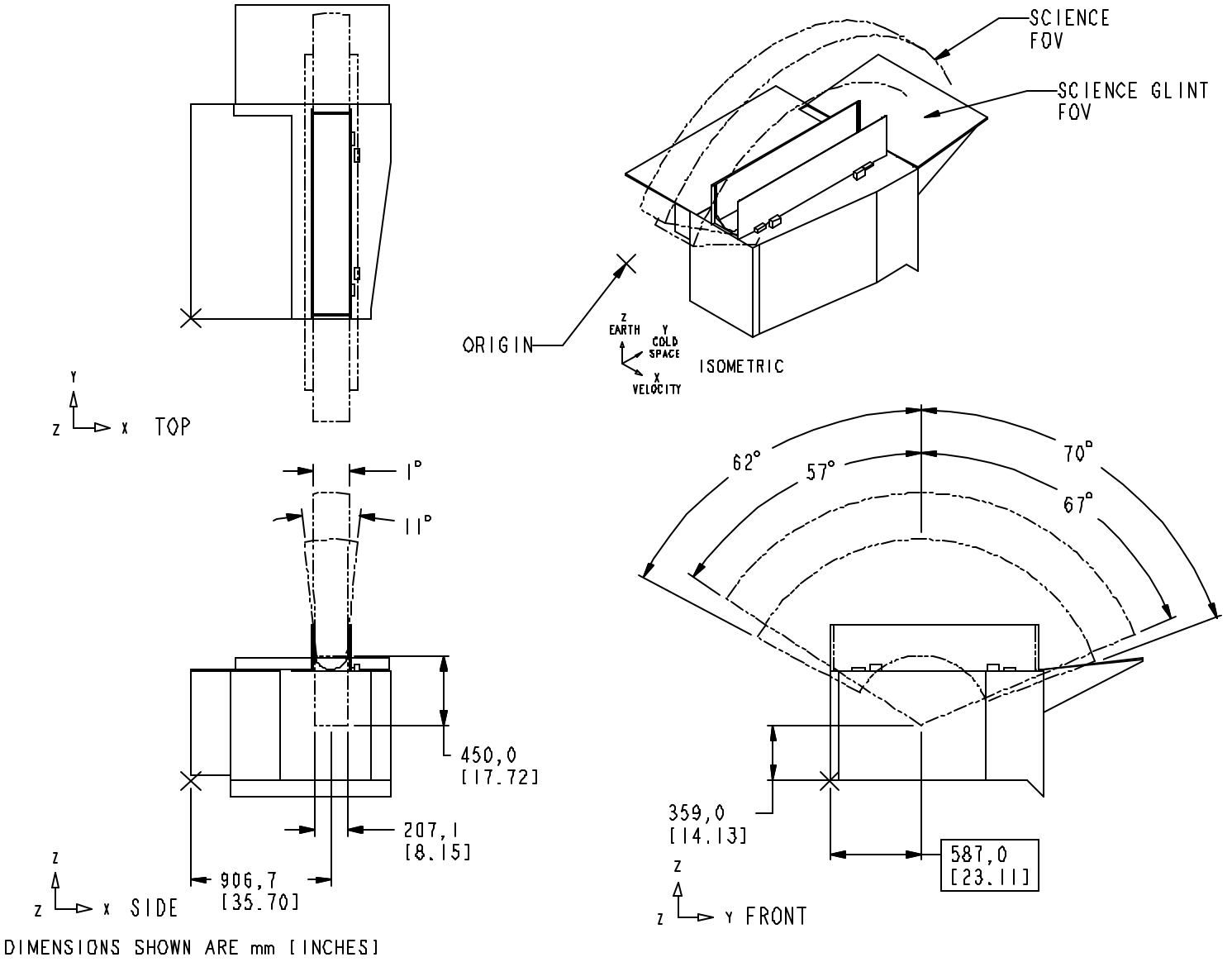


Figure 3-3. VIIRS Radiometric Field-of-View Allocation

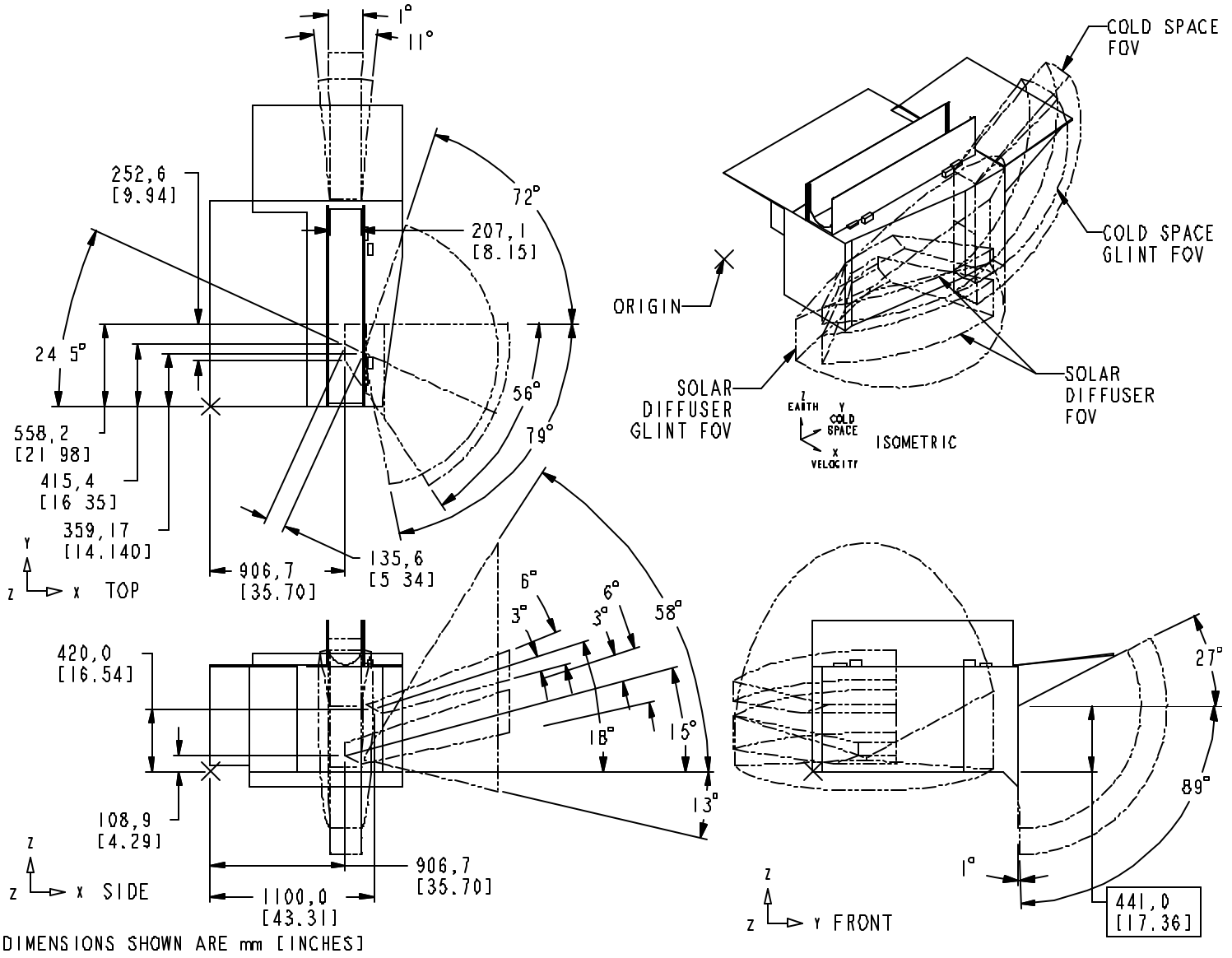


Figure 3-4. VIIRS Detector-Cooling Field-of-View Allocation

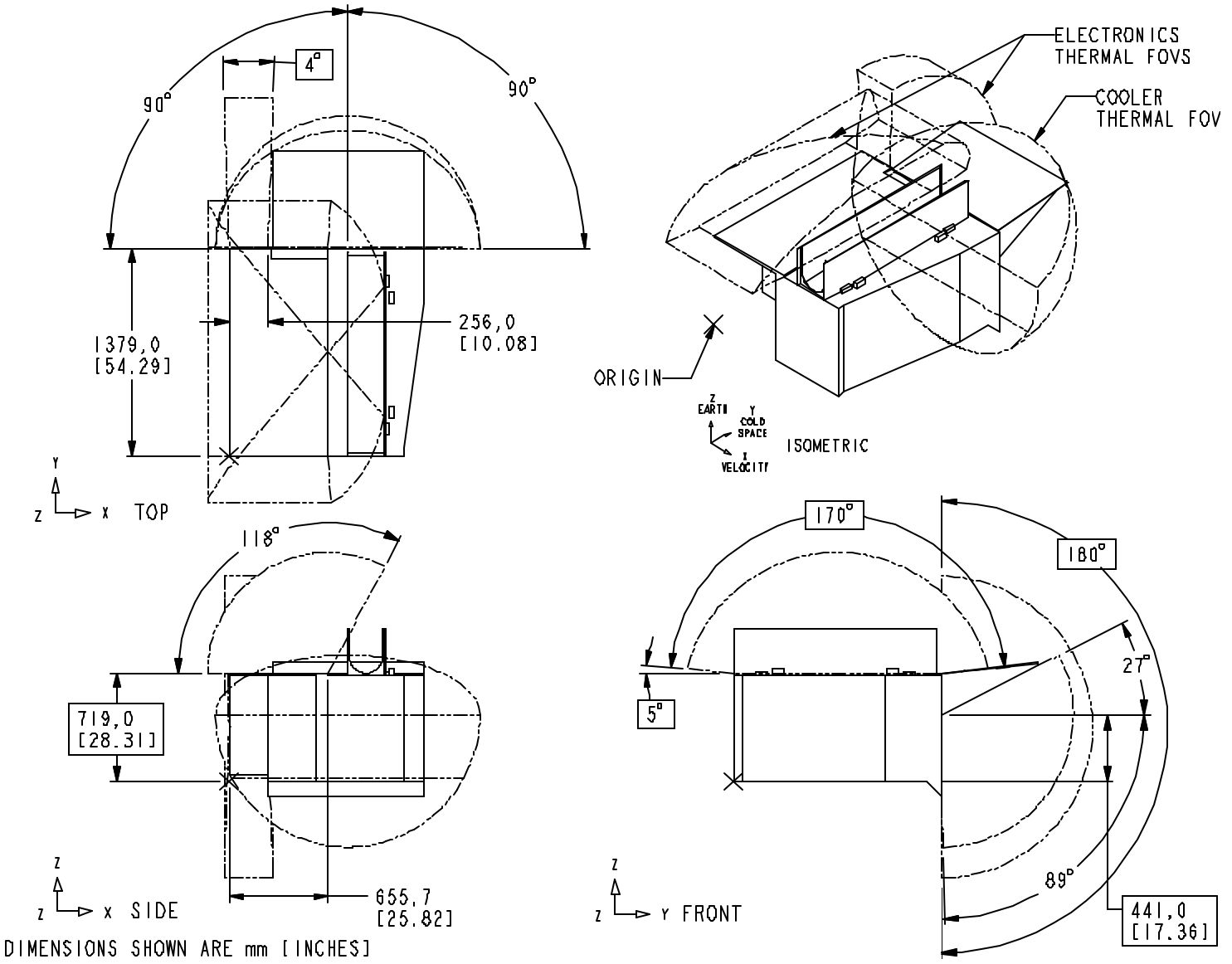
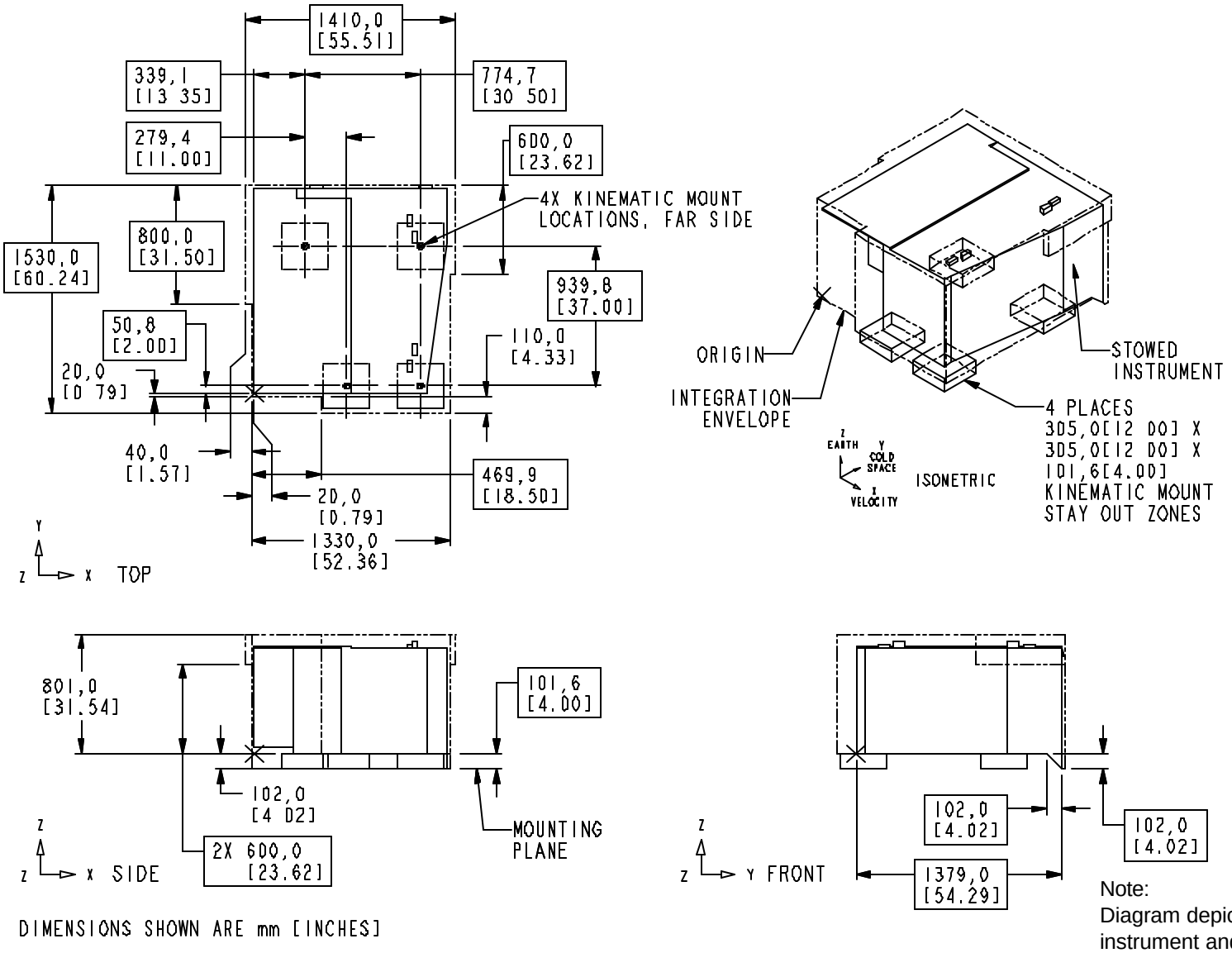


Figure 3-5. VIIRS Thermal Field-of-View Allocation



Note:
Diagram depicts allocation for instrument and lifting fixture.

Figure 3-6. VIIRS Installation/Removal Volume Allocation

3.4 POINTING ALLOCATIONS

Pointing knowledge, control, jitter and rate stability requirements shall be as specified in Table 3-1, Table 3-2, and Table 3-3. Definitions are illustrated in Figure 3-7, and are defined as follows for each spacecraft axis:

Knowledge - The angle between the actual pointing direction and the estimated pointing direction.

Control - The angle between the actual pointing direction and the desired pointing direction.

Jitter - The peak variation in the actual pointing direction over a relatively short time interval.[1]

Rate Stability - The rotational rate error between the actual rate and the desired rate.

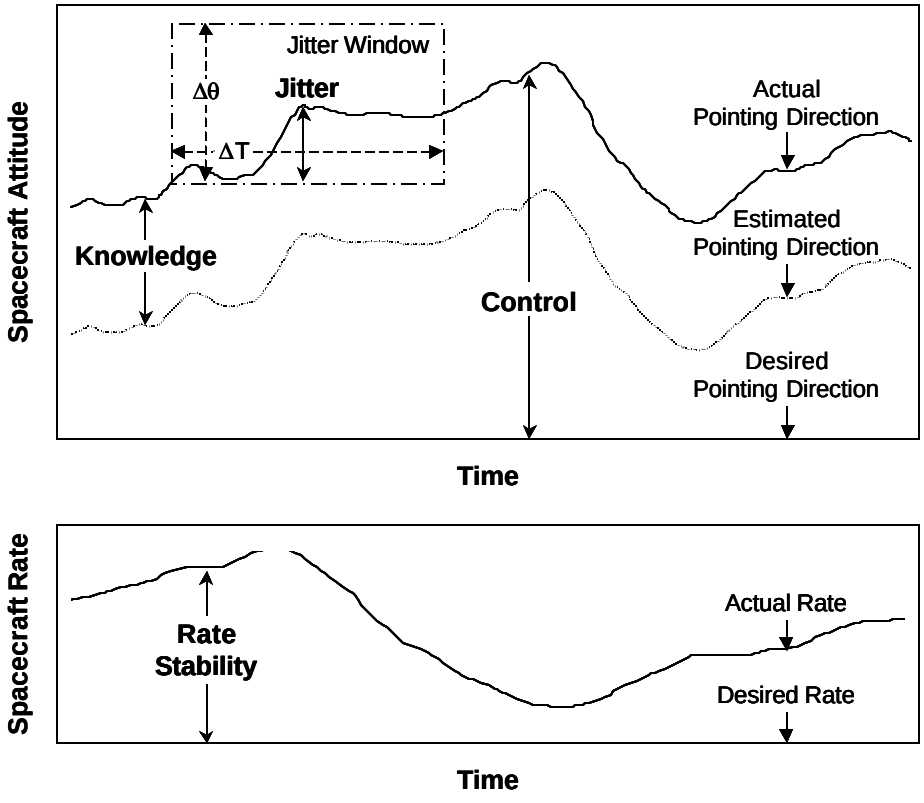


Figure 3-7. Pointing terminology.

For reference, pointing knowledge and control budgets are provided in Figure 3-8 and Figure 3-9, as a basis for the allocations.

[1] Short refers to time intervals so short that the controller lacks sufficient bandwith to respond. The duration typically derives from instrument integration or scan times.

Table 3-1
VIIRS Geolocation, Position and Pointing Requirements and Allocations

Pixel Geolocation Requirements	Knowledge (m) 3σ
Pixel Geolocation Requirement at Nadir: [1]	200 (circular) [2]

Orbit Position Knowledge Requirement	Knowledge (m) 3σ
Radial, In-Track, Cross-Track:	75

Pointing Requirement and Allocation

Allocations	Control Per Axis (arcsec) 3σ	Knowledge Per Axis (arcsec) 3σ	
Pointing Requirement: Instrument boresight points toward the Geodetic target frame of reference [3]	900	Static & Dynamic Dynamic	125 29.7
Unallocated Margin: Arithmetically subtracted from the pointing requirement [4]	0	Static & Dynamic Dynamic	0.0 0.0
Instrument Allocation: Instrument optical axis to mounting interface	150	Static & Dynamic Dynamic	90.0 21.0
Spacecraft Allocation: Instrument mounting interface to frame of reference [5]	887	Static & Dynamic Dynamic	86.2 21.0

Notes

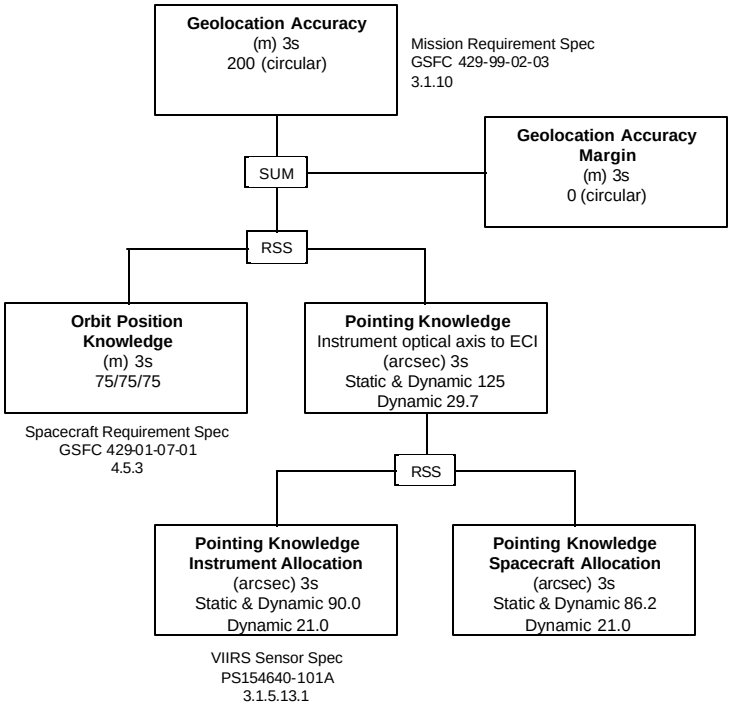
1. Geolocation knowledge is the RSS of the orbital position knowledge and the pointing knowledge, where the orbital position knowledge is the RSS of the in-track and cross-track components, and the pointing knowledge is the RSS of the roll and pitch knowledge converted to meters at nadir assuming an 824 km orbit altitude.

2. Instrument and spacecraft allocations for pointing knowledge include static and dynamic error sources. To meet the 200 meter 3σ (circular) geolocation requirement, on-orbit alignment, calibration and post–processing techniques shall be used to eliminate static instrument and spacecraft error sources. This reduces the pointing knowledge allocations to the dynamic error terms.

3. The Geodetic target coordinate frame of reference is defined as follows: It is a right-handed, orthogonal frame of reference. The +Z axis is from the spacecraft's center-of-mass and points toward the Geodetic nadir. The +X axis is in the general direction of the instantaneous orbital velocity vector. The +Y axis is in the general direction of the orbit normal, opposite the orbital angular momentum.

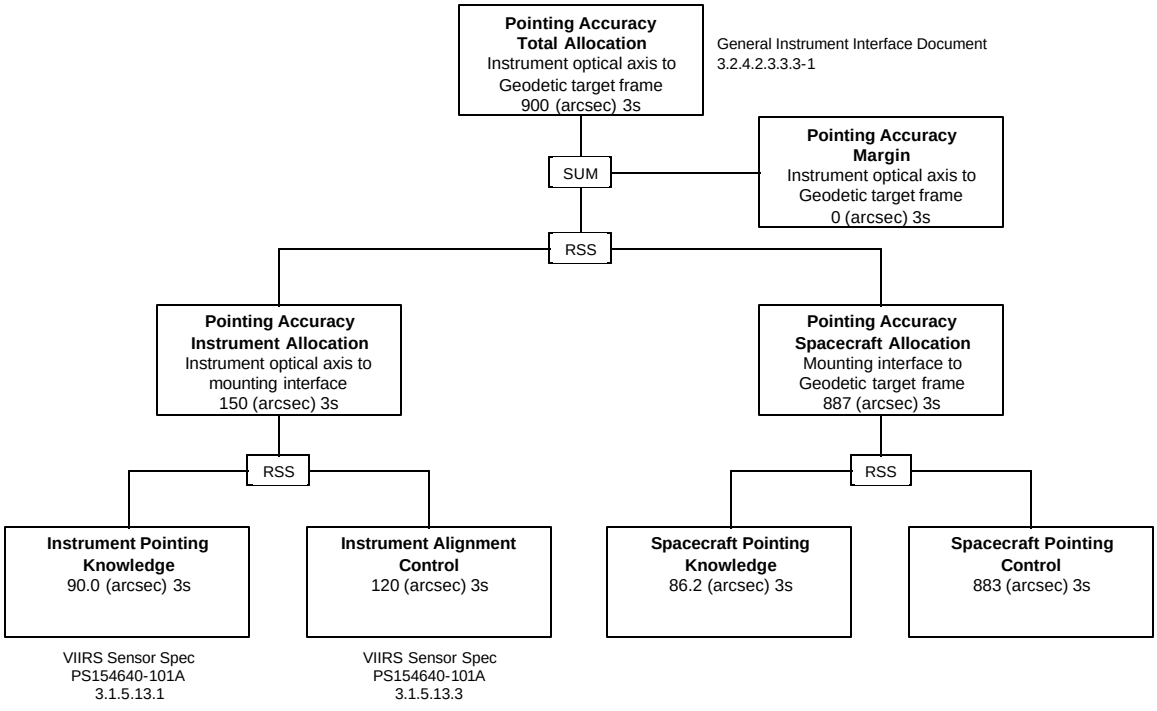
4. The unallocated margin is arithmetically summed with the RSS of the instrument and spacecraft allocation to meet the control/knowledge requirement.

5. For control, the frame of reference is the Geodetic target frame. For knowledge the frame of reference is the J2000 ECI frame.



Note: Provided for reference only to describe basis of UIID requirements.

Figure 3-8. VIIRS pointing knowledge budget.



Note: provided for reference only to describe basis of UIID requirements.

Figure 3-9. VIIRS pointing control budget.

Table 3-2
VIIRS Jitter Requirements and Allocations

Allocations	Jitter $\frac{\Delta\theta \text{ (arcsec) peak}}{\Delta T \text{ (sec)}}$		
	Roll	Pitch	Yaw
Jitter Requirement: Instrument mounting interface to Geodetic target frame of reference[1]	No Requirement	18.6 arcsec 1.78 sec	20.6 arcsec 1.78 sec
Unallocated Margin: Arithmetically subtracted from the jitter requirement[2]	No Requirement	0.0 arcsec 1.78 sec	0.0 arcsec 1.78 sec
Spacecraft Allocation: Instrument mounting interface to Geodetic target frame of reference	No Requirement	18.6 arcsec 1.78 sec	20.6 arcsec 1.78 sec

Notes

1. The Geodetic target coordinate frame of reference is defined as follows: It is a right-handed, orthogonal frame of reference. The +Z axis is from the spacecraft's center-of-mass and points toward the Geodetic nadir. The +X axis is in the general direction of the instantaneous orbital velocity vector. The +Y axis is in the general direction of the orbit normal, opposite the orbital angular momentum.

2. The unallocated margin is arithmetically summed with the spacecraft allocation to meet the jitter requirement.

Table 3-3
VIIRS Rate Stability Requirements and Allocations

Allocations	Rate Stability (deg/sec) 3σ		
	Roll	Pitch	Yaw
Rate Stability Requirement: Instrument mounting interface to Geodetic target frame of reference[1]	0.029	0.029	0.029
Unallocated Margin: Arithmetically subtracted from the rate stability requirement[2]	0.0	0.0	0.0
Spacecraft Allocation: Instrument mounting interface to Geodetic target frame of reference	0.029	0.029	0.029

Notes

1. The Geodetic target coordinate frame of reference is defined as follows: It is a right-handed, orthogonal frame of reference. The +Z axis is from the spacecraft's center-of-mass and points toward the Geodetic nadir. The +X axis is in the general direction of the instantaneous orbital velocity vector. The +Y axis is in the general direction of the orbit normal, opposite the orbital angular momentum.

2. The unallocated margin is arithmetically summed with the spacecraft allocation to meet the rate stability requirement.

3.5 Electronics Module Thermal I/F

The Electronics Module shall mount to a spacraft provided cold plate and gasket. The cold plate shall remove 60 watts of heat at an I/F temperature of 10°C.

4.0 CONSTRAINTS

In order to ensure proper instrument performance or to prevent possible instrument damage, the following constraints are imposed by the VIIRS instrument developer on spacecraft integration and test activities, including launch, activation, and operational.

No constraints have been identified.

5.0 DEVIATIONS/WAIVERS

This section specifically identifies VIIRS requirements that deviate from those defined in the GIID, latest revision, or the VIIRS Sensor Specification, latest revision. Paragraph titles and numbers, identified in parentheses, are those from the GIID, or the VIIRS Sensor Specification.

5.1 GENERAL INSTRUMENT INTERFACE DOCUMENT (GIID) DEVIATIONS / WAIVERS

Exceptions to the GIID are noted in the VIIRS IDD. No deviations or waivers have been identified.

5.2 VIIRS SENSOR SPECIFICATION DEVIATIONS / WAIVERS

No deviations or waivers have been identified.

6.0 APPENDICES

Appendix A VIIRS Resource Summary

Appendix B Acronyms

Appendix C Rationale Matrix

Appendix A
Table A-1 VIIRS Resource Summary (Form)

RESOURCE SUMMARY

(INSTRUMENT) (DATE)	Weight (Kg)	1-Orbit Avg. Operational Power (w)	2-Orbit Avg. Operational Power (w)	Peak Power (w)	Avg. Data Rate (Kbps)	Peak Data Rate (Kbps)
ALLOCATION CURRENT ESTIMATE PREVIOUS ESTIMATE CHANGE FROM LAST REPORT MARGIN TO ALLOCATION						

WEIGHT

CLASS (PERCENT)	
ESTIMATED	
CALCULATED (layouts and drawings)	
FLIGHT MEASURED	

POWER

CLASS (PERCENT)	1-Orbit Avg.	2-Orbit Avg.	Peak
ESTIMATED			
MEASURED			

POINTING SUMMARY

	Knowledge (arcsec) 3σ			Control (arcsec) 3σ			Jitter (arcsec/sec) 3σ			Rate Stability (deg/sec) 3σ		
	Roll	Pitch	Yaw	Roll	Pitch	Yaw	Roll	Pitch	Yaw	Roll	Pitch	Yaw
ALLOCATION												
CURRENT ESTIMATE												
PREVIOUS ESTIMATE												
CHANGE FROM LAST ESTIMATE												
PERCENT MARGIN[1]												

[1]Defined as (allocation-current estimate)/allocation

Appendix B

Acronyms

APID	Application Process Identification
BDU	Bus Data Unit
bps	bits per second
C&DH	Command and Data Handling
CCR	Configuration Change Request
CCSDS	Consultative Committee for Space Data Systems
CDR	Critical Design Review
CSRD	Common Section of the Sensor Requirements Document
FOV	Field-of-View
GIID	General Instrument Interface Document
GSE	Ground Support Equipment
GSFC	Goddard Space Flight Center
ID	Identification
kg	kilograms
LSB	Least Significant Bit
MAR	Mission Assurance Requirements
Mbps	Megabits per second
mm	millimeter
MSB	Most Significant Bit
N/A	Not Applicable
NASA	National Aeronautics and Space Administration
NPP	NPOESS Preparatory Project
NPOESS	National Polar-Orbiting Operational Environmental Satellite System
PDR	Preliminary Design Review
RSS	Root Sum Square
TBD	To Be Determined
TBR	To Be Resolved
TBS	To Be Supplied
UIID	Unique Instrument Interface Document
VIIRS	Visible Infrared Imaging Radiometer Suite
W	Watt

CHECK THE NPP WEBSITE AT http://jointmission.gsfc.nasa.gov TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE.

Appendix C

Table C-1
VIIRS UIID Rationale Matrix

UIID Spec. Req.	Title	Rationale
3.1.1	VIIRS Science Data	N/A
3.1.1.1	Average Science Data Rate Allocation	Derived from the VIIRS Sensor Specification, plus NPP contingency. Ref. 3.2.1.5.1.3
3.1.1.2	Peak Science Data Rate Allocation	Derived from the VIIRS Sensor Specification plus NPP contingency. Ref. 3.2.1.5.1.3
3.1.2	Command, Telemetry, and Science Data	Based on CSRD and VIIRS PDR design.
3.1.2.1	Interface Buses	Based on CSRD and VIIRS PDR design.
3.1.3	Science-Data Application Process IDS	Estimated based on similar prior instrument (EOS MODIS).
3.1.4	Discrete Interface Allocation	Based on CSRD and VIIRS IDD. Ref. 3.10
3.1.5	Deleted	
3.1.6	Instrument Housekeeping Data Rate Allocation	Estimated based on VIIRS Sensor Specification . Ref. 3.2.2.5.3
3.1.7	Deleted	
3.2	POWER ALLOCATIONS	N/A
3.2.1	Power/Power Return Feeds	Derived from the VIIRS Sensor Specification plus NPP contingency. Ref. 3.2.1.3.2
3.2.2	Peak Operational Power Allocation	Derived from the VIIRS Sensor Specification plus NPP contingency. Ref. 3.2.1.3.2
3.2.3	Average Operational Power Allocation	Derived from the VIIRS Sensor Specification plus NPP contingency. Ref. 3.2.1.3.2
3.2.4	Average Calibration Power Allocation	Based on VIIRS PDR design.
3.2.5	Average Outgassing Power Allocation	Requirements clarified as a result of VIIRS IID paragraph 3.5.1.
3.2.6	Peak Survival-Mode Power Allocation	Based on VIIRS IDD. Ref. 3.9.1, and VIIRS Sensor Spec. Ref. 3.2.1.4
3.2.7	Telescope Stow Power Allocation	This power is required to hold the telescope in the stowed position.
3.2.8	Launch-Mode Power Allocation	Based on VIIRS PDR design.
3.3	MECHANICAL ALLOCATIONS	N/A
3.3.1	Mass Properties	N/A
3.3.1.1	Mass Allocation	Derived from the VIIRS IDD, and also to provide NPP contingency. Ref. 3.3

Appendix C

Table C-1
VIIRS UIID Rationale Matrix

UIID Spec. Req.	Title	Rationale
3.3.1.2	Mass Expendables	Based on VIIRS PDR design.
3.3.2	Volume and Fields-of-View Allocations	N/A
3.3.2.1	Launch Volume Allocation	Based on VIIRS IDD plus NPP contingency. Ref. 3.3.2
3.3.2.2	Operational Volume Allocation	Based on VIIRS IDD plus NPP contingency. Ref. 3.3.2
3.3.2.3	Radiometric Fields-of-View Allocations	Based on VIIRS IDD. Ref. 3.4.3.1
3.3.2.4	Detector-Cooling Field-of-View Allocation	Based on VIIRS IDD. Ref. 3.4.3.2
3.3.2.5	Installation/Removal Volume Allocation	Add VIIRS installation envelope to accommodate Opto-Mechanical and Electronics Modules Lifting Fixture.
3.3.3	Instrument Mounting	Based on VIIRS IDD. Ref. 3.5.2
3.4	POINTING ALLOCATIONS	Based on VIIRS Sensor Specifications and PDR design. The rms value of combination of three SRD requirements, namely Structural Thermal Distortion Uncertainty (30 arc sec 3 sigma), Attitude Reference Knowledge (30 arc sec 3 sigma), Attitude Reference Control (108 arc sec 3 sigma), and two Aqua CDR Pointing Budget namely, Alignment Control (900 arc sec), and Alignment Knowledge (75 arc sec), giving a value of 911. TBR
4.0	CONSTRAINTS	N/A
5.0	DEVIATIONS / WAIVERS	N/A
5.1	GIID DEVIATIONS / WAIVERS	N/A
5.2	VIIRS SENSOR SPECIFICATION DEVIATIONS / WAIVERS	N/A